KTSSYSTEME

KOMMUNIKATIONSTECHNIK & SYSTEME

Tag 2 Image v2 – User Manual

Rev. 1.2

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1 Introduction

The main purpose of Tag 2 Image is to allow a graphical representation of the tags detected by the KTS RFID reader family. This is possible by mapping the transponders unique identifier with different images on your hard disk drive and displaying the corresponding image each time a tag is detected. Furthermore, Tag 2 Image allows an easy configuration of the different reader functions.

1.1 Usage and Disclosure Restrictions

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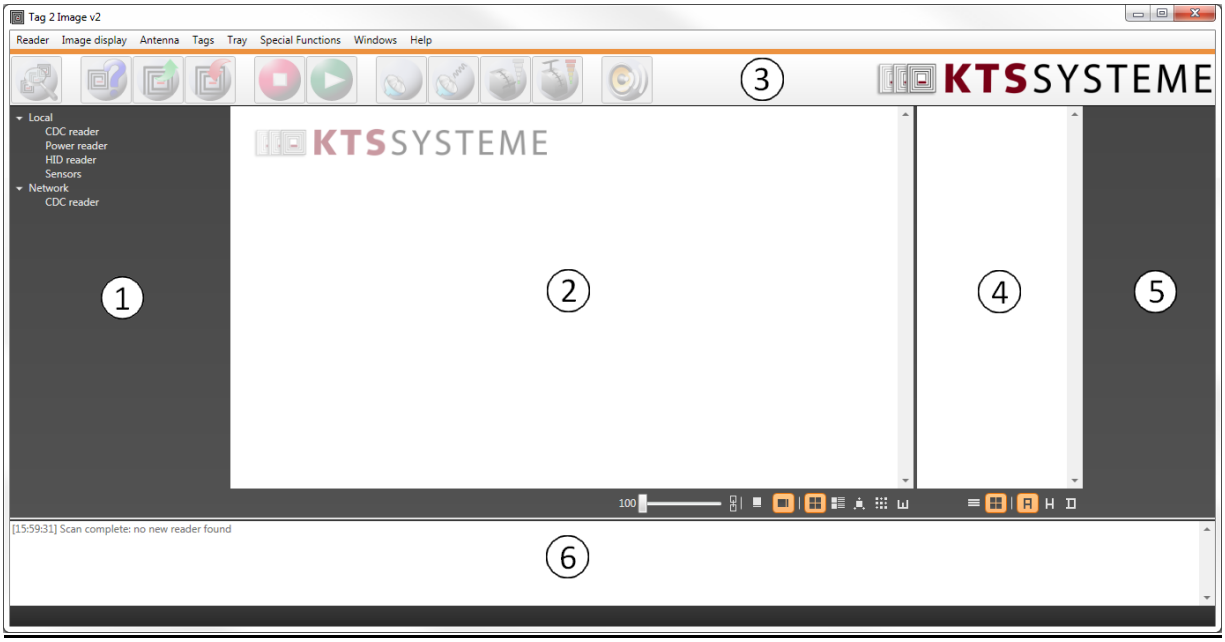
2 Main Window



The main window of Tag 2 Image is divided into the following parts:

(1) Device list

(2) Image display

(3) Reader toolbar

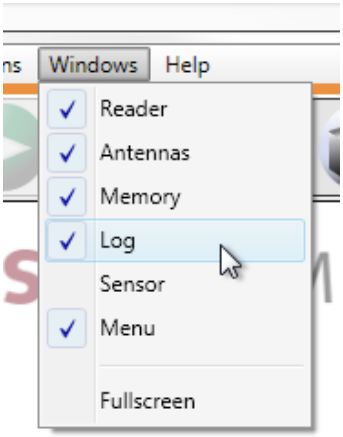
(4) Memory display

(5) Antenna list

(6) Log display

2.1 Show or hide parts of the window

You can show or hide the device list, the reader toolbar, the memory display, the antenna list and the log display. To change the visibility you have to respectively check or clear the corresponding menu item in the *Windows* menu.

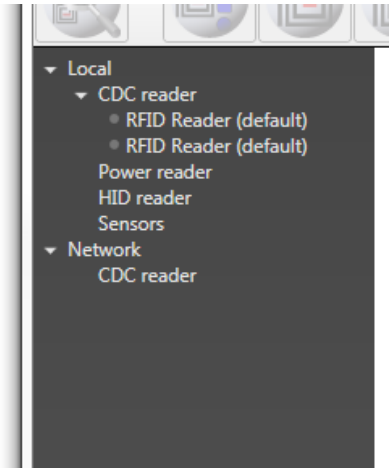


2.2 Switch Tag 2 Image to full screen mode

You can display Tag 2 Image in full screen mode by checking the *Fullscreen* option in the menu *Windows*. To switch back to windowed mode you have to clear the menu item again.

3 Device list

The device list shows all devices currently in use with Tag 2 Image.



The following hardware devices are supported:

- KTS RFID Reader in CDC mode
- KTS RFID Reader in HID mode

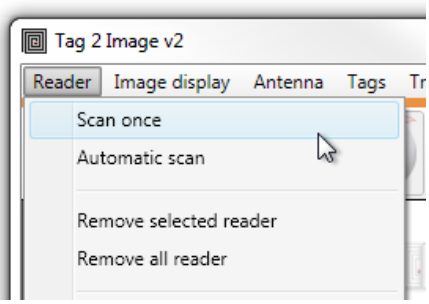
Since Tag 2 Image is created primarily for the usage with the KTS RFID Reader in CDC mode, this manual will always refer to this device type if not specified differently.

For the functionality of the KTS RFID Reader in HID mode, please refer to chapter 11.

3.1 Add a reader to the device list

Tag 2 Image is able to automatically search for connected readers on all COM ports. You have two options to start a new search:

1. Scan Once: through the menu *Reader* → *Scan once* you can start a single search over all ports. Any pending search has to complete before issuing a new one. Once the scan has finished, the log will display the message “Scan complete” followed by the number of readers found.
2. Automatic scan: you can check the menu item *Reader* → *Automatic scan* which will start a new search every few seconds until you stop it again.



If a reader is found, the message “Reader added” will be displayed in the log and the reader is added to the device list within the category *Local/CDC reader*. Tag 2 Image will now try to discover the device information. This includes the number of antennas, the state of the HF field, the selected ISO modes, the scan mode and the LED states of the reader. The success or failure messages for each of these discovers are shown in the log afterwards. ***On failure, please refer to the corresponding sub-chapter of Chapter 5 to learn how to manually request a new discovery of these values***.

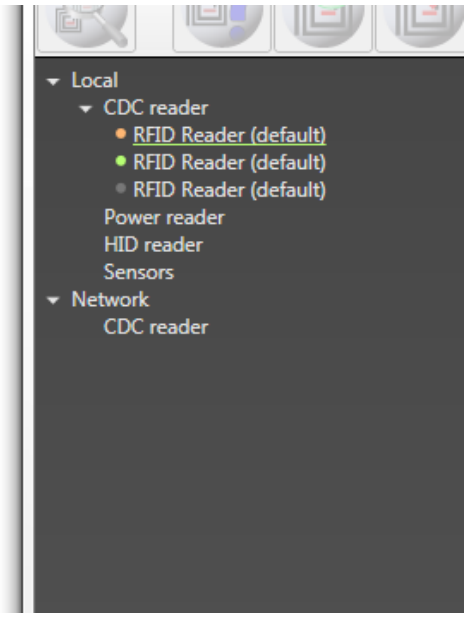
Disconnecting a reader or disabling power of a reader while it is in use by Tag 2 Image may cause unexpected application behavior.

If Tag 2 Image is unable to find the reader, please make sure the COM port used by the device is not in use by another application.

3.2 Remove a reader from the device list

You can either remove a single reader from the device list by selecting it in the reader list and using *Reader → remove selected reader* or you can remove all reader from the list by using *Reader → remove all reader.* This will completely remove the reader from Tag 2 Image and you can unplug the reader safely or use the COM port with another application.

3.3 Select a reader



You can select a reader in the device list with a *left click* on its name. The selected reader is underlined in the list and the status indicator near the name switches to orange (if the reader is also tagged, the status indicator will be green). To deselect a reader, hold the *CTRL* key and *left click* on the selected reader.

Note that you can only have one selected reader at the same time and selecting another reader will remove the previous selection.

3.4 Tag a reader

You can tag a reader in the device list with a *shift + left click* on its name. The selected reader has its status indicator near the name switched to green. A tagged reader cannot be configured (change the scan mode...) but has its detected tags displayed on the image display. To remove the tag, you can *shift* + *left click* on the reader again.

A reader can be selected and tagged at the same time. It will still be underlined but the status indicator will not be orange but green. A reader which is selected and tagged has the same functionality as a selected reader.

3.5 Show device information

Hovering the mouse pointer over a reader in the device list will open a tooltip containing the hardware and firmware information for this reader.

This tooltip contains:

- S/N: the serial number of the device
- The firmware build number
- The firmware build date

If the tooltip displays the message “Reader information not available”, please see chapter 5.9 to request a new discovery of the reader information.

3.6 Change displayed reader name

You can change the displayed name of a reader by right clicking on it in the reader list and selecting the *Rename* option in the context menu. This will open a window allowing you to specify your desired name.

Changing the name is only temporary and the change is lost once you close Tag 2 Image

4 Reader Toolbar

The reader toolbar is located on the top of the window and allows a simple access to the most frequently used reader functionalities.

Perform an anti-collision inventory scan

Read tag system information

Read tag memory

Write tag memory

Disable/enable reader scan mode

Disable/enable HF field

Set low/high HF field power

Play a sound

For a detailed description of these functionalities, please refer to the corresponding sub-chapter of the chapter Basic reader functionality.

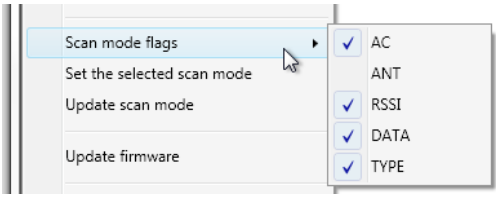
5 Basic reader functionality

5.1 Change the reader scan mode

Tag 2 Image allows you to change the scan mode of the selected reader using a combination of the following scan flags:

Flag	Description
AC	Anti-collision: Allows the simultaneous detection of several tags.
ANT	Antenna: The reader reports on which antenna(s) a tag has been detected. This information is necessary if you want to either filter you tag display by antenna in default/details mode or if you want to use the free positioning mode or the grid mode since it is impossible to compute the position of the tag if this information is not available.
RSSI	Received signal strength indication: If the flag is set, Tag 2 Image can display the exact RSSI value for each tag on the right side of their thumbnail image in default, details and free positioning mode. If the flag is not set, the displayed indicator assumes full signal strength.
DATA	Tag memory content: The reader also reports the memory content of a tag. This allows you to select a tag on the image display and see its memory content in the memory display.
TYPE	Tag type: The reader reports the type for each tag. You can display the type of a detected tag in the default and details display modes. The possible types are: ISO15693, MIFARE 1k,MIFARE 4k, MIFARE PLUS, MIFARE DESFIRE.

These flags can be selected in the menu *Reader → Scan mode flags*. The selected scan mode flags can now be set on the selected reader via the menu *Reader → Set the selected scan mode*.



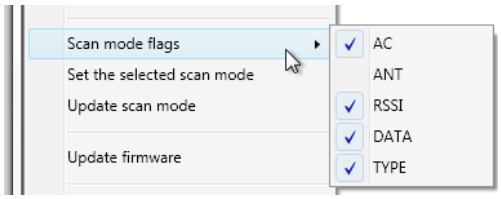
If the change was successful the log will show the message “Scan mode changed”. If not, the log will show “Scan mode could not be changed” and the reader scan mode will be in an unknown state and you have to set the scan mode again. You can see the scan mode of the selected reader in the status bar (note that the scan mode flags are only visible if the scan mode is enabled).

5.2 Enable and disable the reader scan mode

You can enable or disable the scan mode for the selected reader using the toolbar buttons as shown on the right. The current scan mode for the selected reader can be seen in the status bar.

Disabling the scan will render the reader unable to detect tags and you will lose all tags currently known by the reader. If the scan mode is disabled on the selected reader, the disable scan button is grayed out.

Enabling the scan mode sets the scan mode to the reader it used before you disabled it. If Tag 2 Image was not able to discover an active scan mode setting before enabling it (e.g. because the reader scan mode was disabled before the reader was added to Tag 2 Image) it enables the scan using the flags set in the menu *Reader → Scan mode flag* (for more information on the different scan mode flags, refer to chapter 5.1). If the scan is already enabled on the selected reader, the enable scan button is grayed out.



If the current state of the scan mode is unknown, the buttons to enable and disable the scan mode are both enabled.

You cannot enable or disable the scan mode if the HF field of the selected reader is either disabled or if its current state has not been discovered.

5.3 Discover the reader scan mode

Use *Reader → Discover scan mode* to discover the scan mode currently in use by the selected reader. This will request the current scan mode from the selected reader and update Tag 2 Image accordingly. Doing so is only needed if Tag 2 Image does not already know the current scan mode of the reader. You can see the current scan mode of the selected reader in the status bar.

5.4 Enable and disable the HF field

You can enable or disable the HF field of the selected reader using the buttons *Activate HF field* and *Deactivate HF field* in the reader toolbar. The current HF field state for the selected reader is shown in the status bar.

If the HF field is enabled, the *Activate HF field* button is grayed out. If not, the *Deactivate HF field button* is grayed out.

Disabling the HF field removes all currently detected tags and you cannot:

- Enable, disable or change the scan mode
- Perform an anti-collision inventory scan
- Get tag system information
- Read or write tag memory
- Set HF power

5.5 Discover HF field status

You can discover the current state of the HF field (enabled/disabled) via the menu *Reader → Discover HF field status*. This will request the current HF field status from the selected reader and result either in the log message "Reader information updated" if the update was successful or "Reader information could not be updated" if not.

The reader automatically performs an HF field status discovery when it is added to the reader list so you only have to update it manually if this update failed.

5.6 Set power of the HF field

The HF field power level of the selected reader can be changed using the *Set HF power to 100mW and Set HF power to 200mW* buttons in the reader toolbar.

This functionality is not available for all reader types. The buttons are grayed out if it is not supported by the currently selected reader.

5.7 Perform anti-collision inventory scan

An anti-collision inventory scan performs one scan on the antennas of the selected reader and show you all detected tags on the image display. You can start scan using the anti-collision inventory scan button in the reader toolbar. This functionality is only enabled if the current reader scan mode is disabled.

5.8 Discover antenna count

You can discover the antenna count of the selected reader via the menu *Reader → Discover antenna count*. This will request the antenna count from the selected reader and result either in the log message "Antenna count updated" if the update was successful or "Antenna count could not be updated" if not.

The reader automatically performs an antenna count discovery when he is added to the reader list so you only have to start it manually if this discovery failed.

5.9 Discover reader information

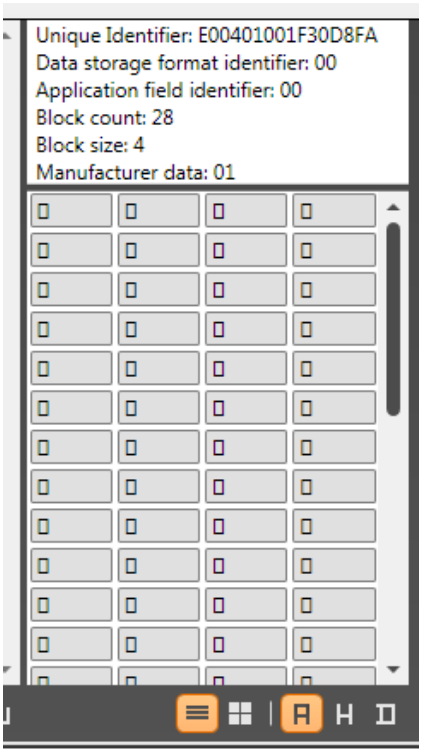
You can discover the reader information of the selected reader via the menu *Reader → Discover reader information*. This will request the product and firmware information for the selected reader and result either in the log message "Reader information updated" if the update was successful or "Reader information could not be updated" if not.

The reader automatically performs a reader information discovery when it is added to the reader list so you only have to start it manually if this discovery failed.

5.10 Get tag system information

Tag 2 Image allows you to read and display the system information of a tag. To do so, you have to first disable the scan mode. Once this is done, you can read the tag system information using the button *Get tag System Information* in the reader toolbar. Note that this will only work if you have only one tag in the detection range of your reader antenna.

To see the tag system information you have to switch your memory display to *READER* mode. This can be done using the button *READER* located bellow the memory display. Once you switched to the *READER* mode, you can see the tag system information on top of the memory display.



The tag system information contains:

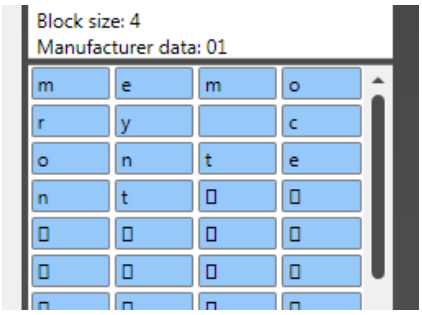
- Unique Identifier of the tag
- Data storage format identifier
- Application field identifier
- Block count: the number of tag memory blocks
- Block size: the number of bytes each memory block contains
- Manufacturer data

After reading the tag system information the memory display also shows a memory grid with the same size as the tag memory.

5.11 Read tag memory content

You can read and display the memory content of a tag. To do so, you first have to disable the scan mode of your selected reader. Once the scan mode is disabled you have to read the system information of the tag (see chapter 5.10). This has to be done since we have to know the exact size of the tag memory to be able to read it. Once the tag system information is available, you can read the memory content using the *Read tag memory* button in the reader toolbar.

To see the tag memory, the memory display has to be in *READER* mode. You can switch the mode using the corresponding button located below the memory display.



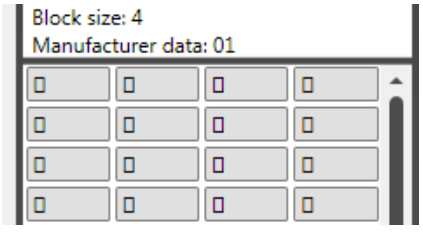
The memory display shows you a grid containing the bytes of the tag memory. The bytes will have a blue background if the read operation was successful and a red background if not.

The byte representation can be switched between ASCII encoding, its hexadecimal value or its decimal value using the menu located bellow the memory display.

5.12 Write memory content

You can change the memory content of a tag. To do so, you first have to disable the scan mode of your selected reader. Once the scan mode is disabled you have to read the system information of the tag (see chapter 5.10). This has to be done since we have to know the size of the tag memory to be able to write it.

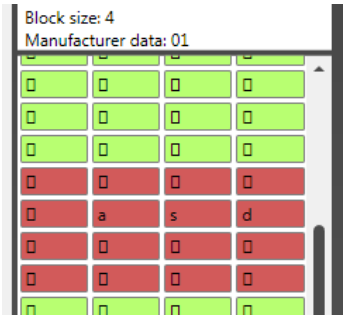
To see the tag memory and be able to modify it, the memory display has to be in *READER* mode. You can switch the mode using the corresponding button located below the memory display.



Once the tag system information is available, the memory display shows a memory grid with the same size as the tag memory. At this point, you can either first read the current tag memory content or directly start to change the bytes in the memory display. The background color for each modified byte is set to gray.

The byte representation can be switched between ASCII encoding, its hexadecimal value or its decimal value using the menu located bellow the memory display.

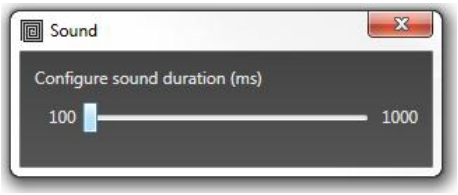
If the display is in ASCII mode, the focus will automatically switch to the next textbox once you have changed a value. If it is in hexadecimal or in decimal mode, you can write in the desired value (00-FF or 0-255) and switch to the next textbox by pressing either TAB or ENTER.



Once you made all desired changes, you can write the tag memory using the *Write tag memory* button in the reader toolbar. Tag 2 Image will now start to write each memory block to the tag. You can see the progress of the write operation on the memory display. If a memory block was written successfully, the background color of its bytes changes to green, otherwise the background color changes to red.

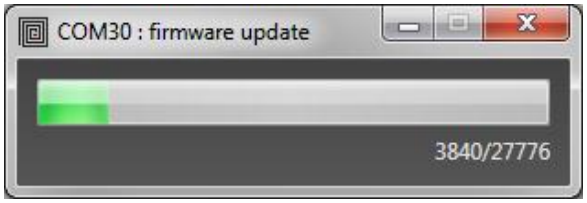
5.13 Play a sound

You can play a sound on the selected reader using the button Play a sound on the reader in the reader toolbar. You can specify the sound duration using via the menu *Reader → Set sound duration*. This will open a window allowing you to specify a sound duration between 100ms and 1000ms.



This functionality is not available for all reader types and the play sound button is grayed out if it is not supported by the currently selected reader.

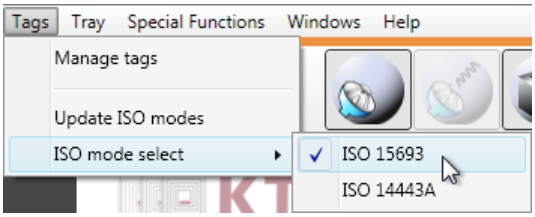
5.14 Update reader firmware



Tag 2 Image allows you to update the firmware of your currently selected reader. To do so, use the menu *Reader → Update firmware*. This will open a windows file dialog allowing you to select the firmware file (extension *.bin*) you want to copy to the reader. Once the file is selected, a window will pop up to show you the firmware upload progress. You can close the progress window at any time since this will not cancel the upload.

The log will show the message “Send update successful” if the upload was successful or “Send update failed” if not. Either way, the reader will be automatically removed from the reader list. If the upload was successful you can add the reader again after waiting for a few seconds, since the reader needs time to perform the update and restart. If the upload failed, you have to unplug and re-plug the reader before future use.

5.15 Change supported ISO modes



The KTS RFID reader can detect ISO15693 and ISO14443A tags. The currently active ISO modes for the selected reader are shown in the status bar. You

can choose which tag type you want to enable or disable for detection on the selected reader by checking or clearing the corresponding option in the menu *Tags → ISO mode select*. The log will show "ISO modes selected" if successful and "Failed to select ISO mode(s)" otherwise.

5.16 Discover ISO modes

You can discover the currently active ISO modes of the selected reader via the menu *Tags → Discover ISO modes*. This will request the ISO modes currently enabled for detection from the selected reader and result either in the log message "ISO modes updated" if the update was successful or "Failed to update ISO modes" if not. The currently active ISO modes for the selected reader are shown in the status bar.

5.17 Switch reader to HID mode

You can switch a selected KTS RFID Reader from CDC to HID mode through the menu *Reader → Switch to HID*. If successful, the reader is removed from the device list. A message showing the success or failure of the operation is added to the log.

6 Image Display

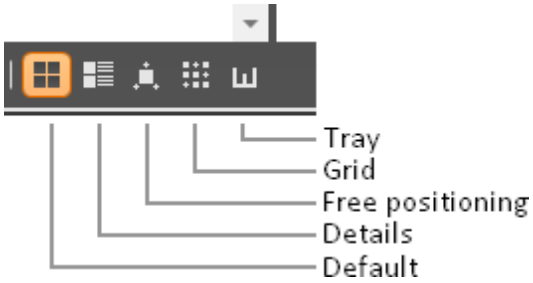
The image display is the main component of Tag 2 Image. It allows a graphical representation of the currently detected tags. To make this possible, you can link the tag UID to an image on your hard disk drive (e.g. an image of the tool containing the tag. For more information about linking a tag UID to an image, please refer to the chapter 7.

The image display can be used in 4 different modes:

- Default
- Details
- Free positioning
- Grid

Each of these modes allows a different representation of the detected tags. For more information about the different modes, please refer to the corresponding sub-chapter.

6.1 Switch between display modes

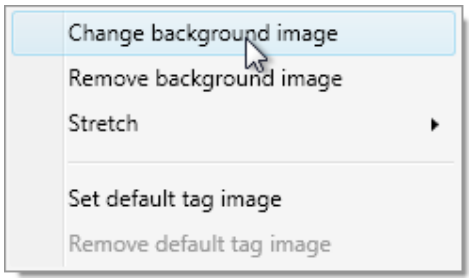


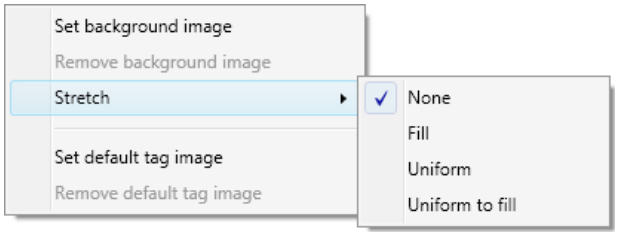
You can switch between the different display modes using the menu below the image display.

6.2 Change background image

You can select a background image for your image display. This image is the same for each display mode and is automatically selected the next time you start Tag 2 Image.

You can select the background image through the option *Set background image* in the context menu of the image display. This will open a windows file dialog allowing you to select the background image you want to use. The option *Remove background image* in the context menu will remove the currently selected background image.





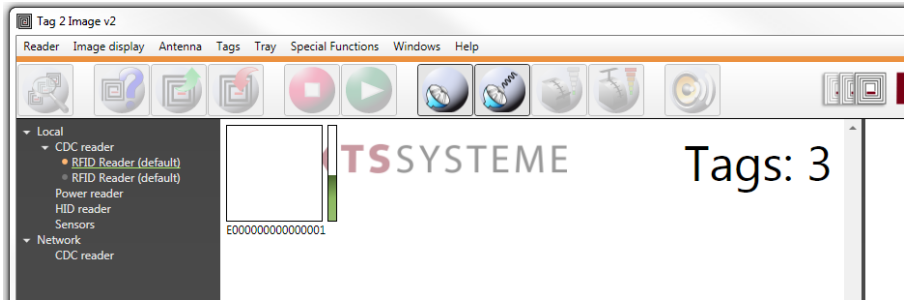
You can chose how the background image is scaled on the display via the *Stretch* submenu in the context menu of the display.

This allows you to choose between the following modes:

- None: the image is not resized in any way and is displayed in the center of the image display.
- Fill: the image is scaled to fit the image display. The aspect ratio may not be preserved.
- Uniform: the image is scaled so that it fits completely within the display. The aspect ratio is preserved.
- Uniform to fill: the image is scaled so that it completely fills the display. The aspect ratio is preserved.

6.3 Display the tag count for the selected reader

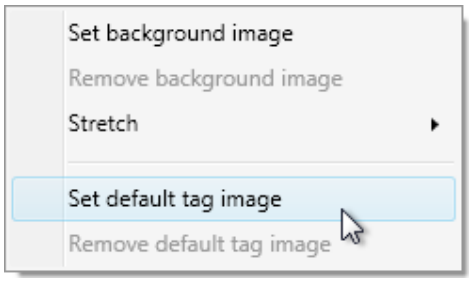
For a better visualization of the number of tags currently detected by a reader, you can display the current tag count for the selected reader in the upper right corner of the image display. You can activate and deactivate this functionality via the menu *Image display* → *Show tag count*.



Note that the displayed value is not the number of tags currently on the image display but the total number of tags detected by the reader you selected in the device list. If no reader is currently selected, the tag count will not be displayed.

6.4 Change default tag image

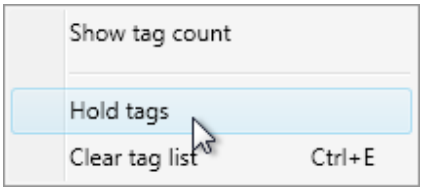
By default the image thumbnail for a tag is empty if no image has been linked to its UID (see chapter 7 for more information on how to link tag UIDs to images). To avoid this, you can specify an image which will be used for each of these tags. To do so, right click on the image display and select *Set default tag image* in the context menu. This will open a windows file dialog allowing you to choose the image you want to use. To remove the image again, select *Remove default tag image* in the context menu.



6.5 Hold tags mode

By default, if a tag is no longer detected by the reader, it is automatically removed from Tag 2 Image and cannot be displayed until it is detected again.

To avoid this, you can activate the *Hold tag mode* on a selected reader. If this mode is activated, the tags will never be removed from Tag 2 Image even if they are no longer detected by the reader. You can activate this mode by checking the option *Image display* → *Hold tags*. Clearing the selection in the menu will deactivate the mode and remove all



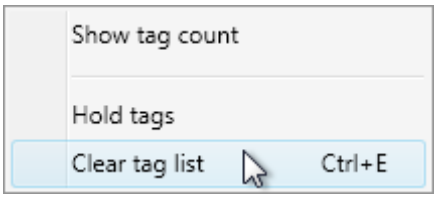
tags currently known by the reader.

While the reader is in *Hold tags mode* you cannot activate or deactivate its scan mode since the

functionality of the corresponding buttons in the reader toolbar has been changed. The enable and disabled scan mode buttons now respectively show or hide all tags known by the reader.

6.6 Clear tag list

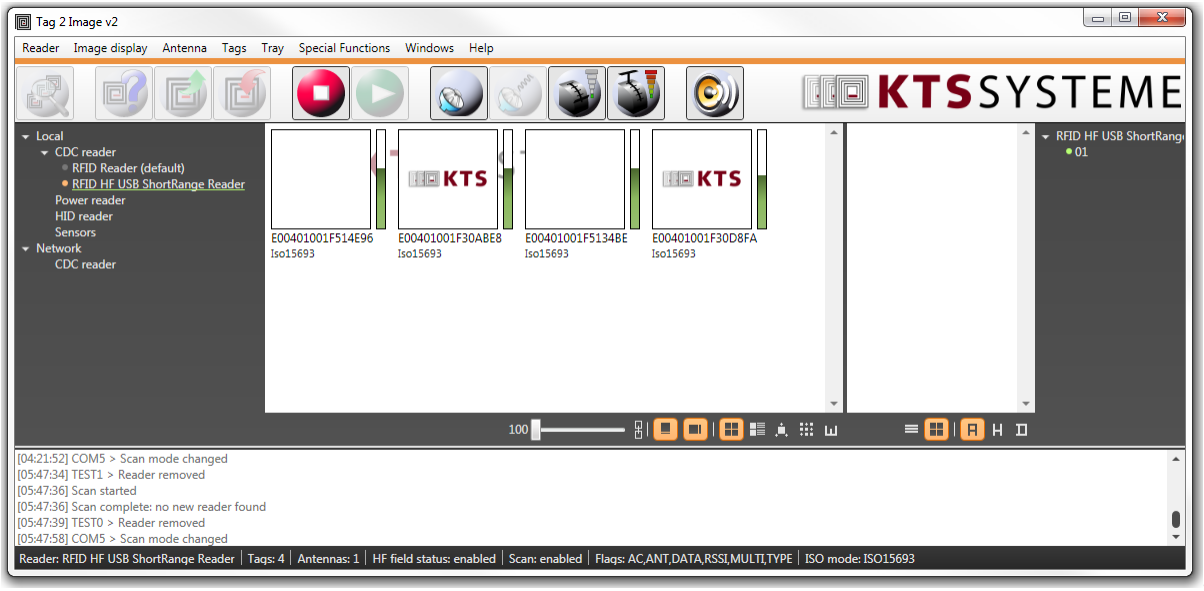
You can clear the tag list of the selected reader through the menu *Image display* → *Clear tag list*. This will remove all tags from Tag 2 Image for the currently selected reader even if they still are detected by this reader.



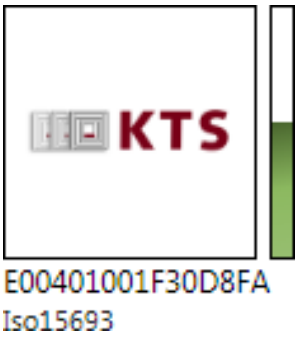
This option is especially useful in combination with the Hold tags mode (see 6.5) since in this mode the tags are not removed from Tag 2 Image even if they are no longer detected by the reader.

6.7 Display mode: Default

In the default display mode, the image display shows a simple thumbnail list view of the tags currently detected by all readers you either selected or tagged in the device list.



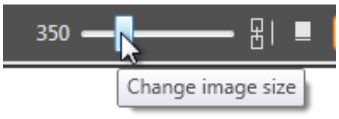
Each tag is represented with the following information:



- **UID**: the unique identifier of the tag
- **Image thumbnail**: displays the thumbnail of the image associated with the tag UID. If we don't have an image linked to the current UID it will either show the thumbnail of the default tag image if we have one or a white space if not.
- **Tag type**: the type of the RFID tag (ISO15693, ISO14443...). To obtain this information you have to set at least the scan flag "TYPE" for the corresponding reader. This information can be hidden.
- **RSSI indicator**: Received Signal Strength Indication for the tag. If the value is not known (i.e. the reader has not set the "RSSI" flag) we assume full strength for the tag. This information can be hidden.

6.7.1 Change thumbnail size

You can change the height and width of the image thumbnails using the slider in the menu located underneath the image display. The size can be chosen in a range from 100 to 1000 pixel with a step size of 10 pixels.



6.7.2 Global resize mode

The global resize mode allows you to specify one image size which will be used for the default display mode, the free positioning display mode as well as the grid display mode. If you activate the global resize mode, the thumbnail size slider will be replaced by one that is shared across these three display modes. It can be activated and deactivated using the button on the right hand side of the thumbnail size slider. Deactivating the global resize mode will replace the shared slider with the individual slider used by this display mode.

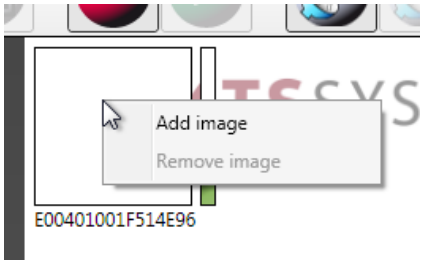
6.7.3 Show/hide RSSI indicator

You can show or hide the RSSI display respectively by checking or unchecking the option *Display RSSI Indicator* in the menu beneath the image display.

6.7.4 Show/hide tag type

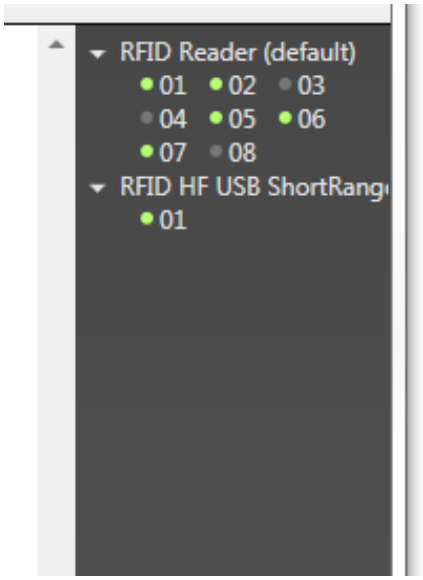
You can show or hide the tag type below each tag respectively by checking or unchecking the option *Display type* in the menu beneath the image display.

6.7.5 Change tag image



A right click on the tag image thumbnail will open a context menu allowing you to either add, change and/or remove the image associated with the UID of this tag. These changes will be lost once you close Tag 2 Image. If you want to keep the changes even after a restart of the application, you have to save the changes to your disk (see chapter 7.4).

6.7.6 Filter image display by antenna

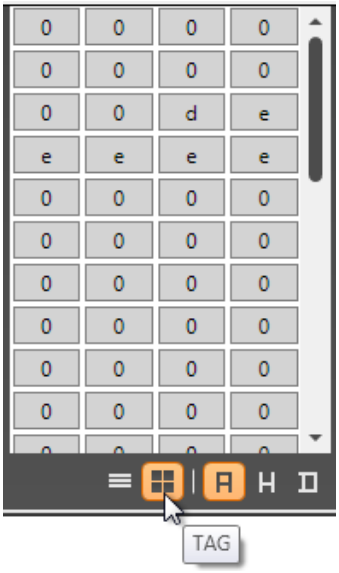


You can filter the image display to show only tags detected on specified antennas. To use this functionality, you have to set the scan flag “ANT” on the reader since otherwise we would have no information concerning the antennas detecting the tag.

The antenna list shows you the antennas for all of your selected or tagged readers and allows you to select or deselect them individually by left clicking on the antenna. The indicator near the antenna number will be green if the antenna is selected and gray if not. Only tags that are detected by at least one of the selected antennas will be displayed.

If the reader has not set the scan mode flag “ANT”, all antennas for this reader are grayed out in the list and the image display shows all tags detected by the reader.

6.7.7 Display memory content of a tag

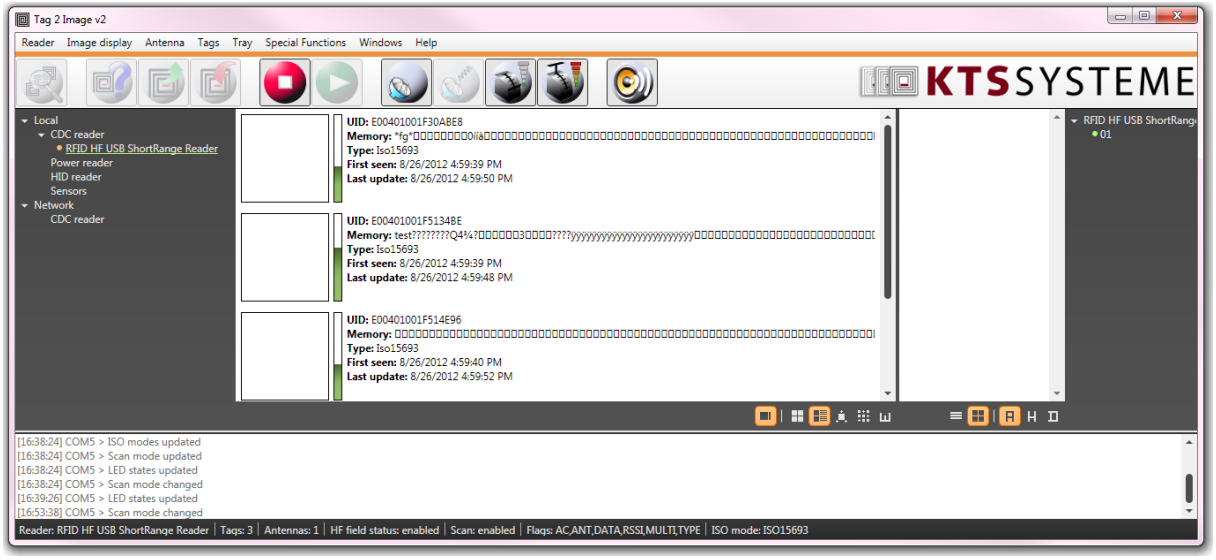


To display the memory content of a tag, you first have to switch the memory display to *TAG mode* using the menu underneath it. Once the memory display is configured correctly you can select a tag on the image display with a simple left click. The memory display will now show the memory content of the selected tag either as ASCII, hexadecimal or decimal values.

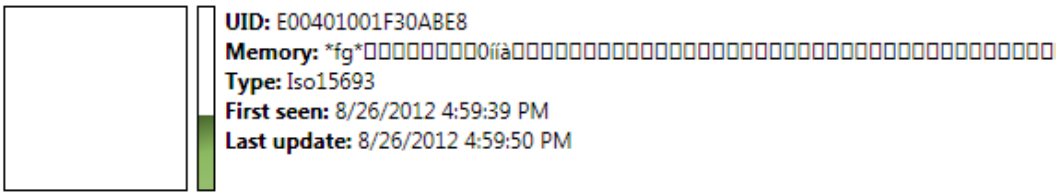
Should no memory be displayed, please make sure the reader on which the tag is detected has set the scan flag “DATA” since the reader would not report the tag memory content otherwise.

6.8 Display mode: Details

In the details display mode, the image display shows a detailed list of the tags currently detected by all readers you either selected or tagged in the device list.


Tag 2 Image v2
Reader Image display Antenna Tags Tray Special Functions Windows Help
KTSSYSTEME
Local
CDC reader
RFID HF USB ShortRange Reader
Power reader
HID reader
Sensors
Network
CDC reader
UID: E00401001F30ABE8
Type: Iso15693
First seen: 8/26/2012 4:59:39 PM
Last update: 8/26/2012 4:59:50 PM
UID: E00401001F5134BE
Type: Iso15693
First seen: 8/26/2012 4:59:39 PM
Last update: 8/26/2012 4:59:48 PM
UID: E00401001F514E96
Type: Iso15693
First seen: 8/26/2012 4:59:40 PM
Last update: 8/26/2012 4:59:52 PM
[16:38:24] COM5 > ISO modes updated
[16:38:24] COM5 > Scan mode updated
[16:38:24] COM5 > LED states updated
[16:38:24] COM5 > Scan mode changed
[16:39:26] COM5 > LED states updated
[16:53:38] COM5 > Scan mode changed
Reader: RFID HF USB ShortRange Reader | Tags: 3 | Antennas: 1 | HF field status: enabled | Scan: enabled | Flags: AC,ANT,DATA,RSSI,MULTI,TYPE | ISO mode: ISO15693

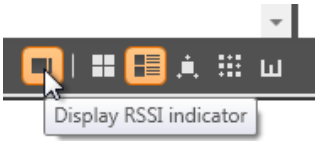
Each tag is represented with the following information:



- **UID**: the unique identifier of the tag
- **Image thumbnail**: displays the thumbnail of the image associated with the tag UID. If we don't have an image linked to the current UID it will either show the thumbnail of the default tag image if we have one or a white space if not.
- **Memory**: the memory content of the tag (unknown if the scan mode flag “DATA” is not set on the reader)
- **Tag type**: the type of the RFID tag (ISO15693, ISO14443...). The type is unknown if the scan mode flag “TYPE” is not set on the reader.
- **First seen**: Date and time the tag was detected by the reader
- **Last update**: Date and time of the last RSSI update for this tag
- **RSSI indicator**: Received Signal Strength Indication for the tag. If the value is not known (i.e. the reader has not set the “RSSI” flag) we assume full strength for the tag. This information can be hidden.

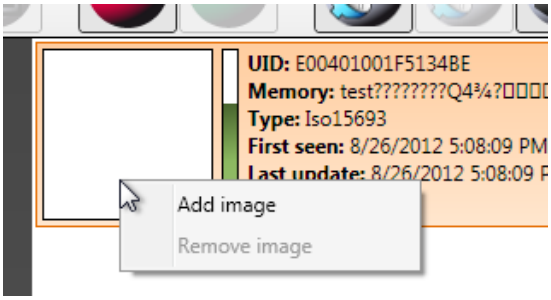
6.8.1 Show/hide RSSI indicator

You can show or hide the RSSI display respectively by checking or unchecking the option *Display RSSI Indicator* in the menu beneath the image display.



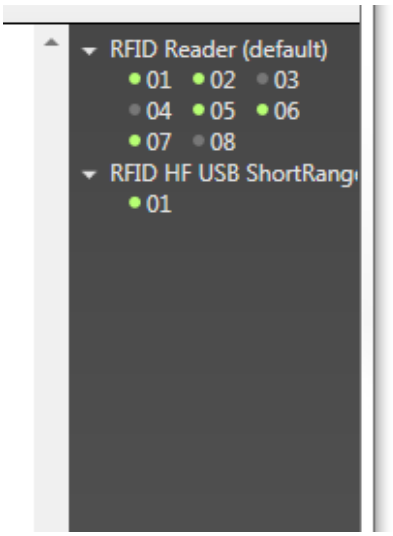
6.8.2 Change tag image

A right click on the tag image thumbnail will open a context menu allowing you to either add, change and/or remove the image associated with the UID of this tag. These changes will be lost once you close Tag 2 Image. If you want to keep the changes even after a restart of the application, you have to save the changes to your disk (see chapter 7.4).



6.8.3 Filter image display by antenna

You can filter the image display to show only tags detected on specified antennas. To use this functionality, you have to set the scan flag “ANT” on the reader since otherwise we would have no information concerning the antennas detecting the tag.

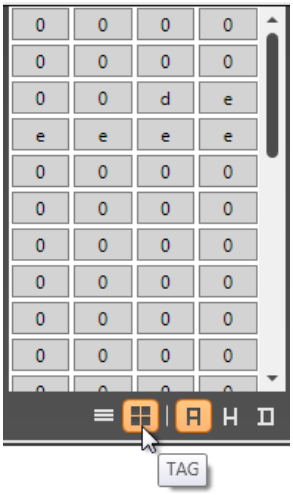


The antenna list shows you the antennas for all of your selected or tagged readers and allows you to select or deselect them individually by left clicking on the antenna. The indicator near the antenna number will be green if the antenna is selected and gray if not. Only tags that are detected by at least one of the selected antennas will be displayed.

If the reader has not set the scan mode flag “ANT”, all antennas for this reader are grayed out in the list and the image display shows all tags detected by the reader.

6.8.4 Display memory content of a tag

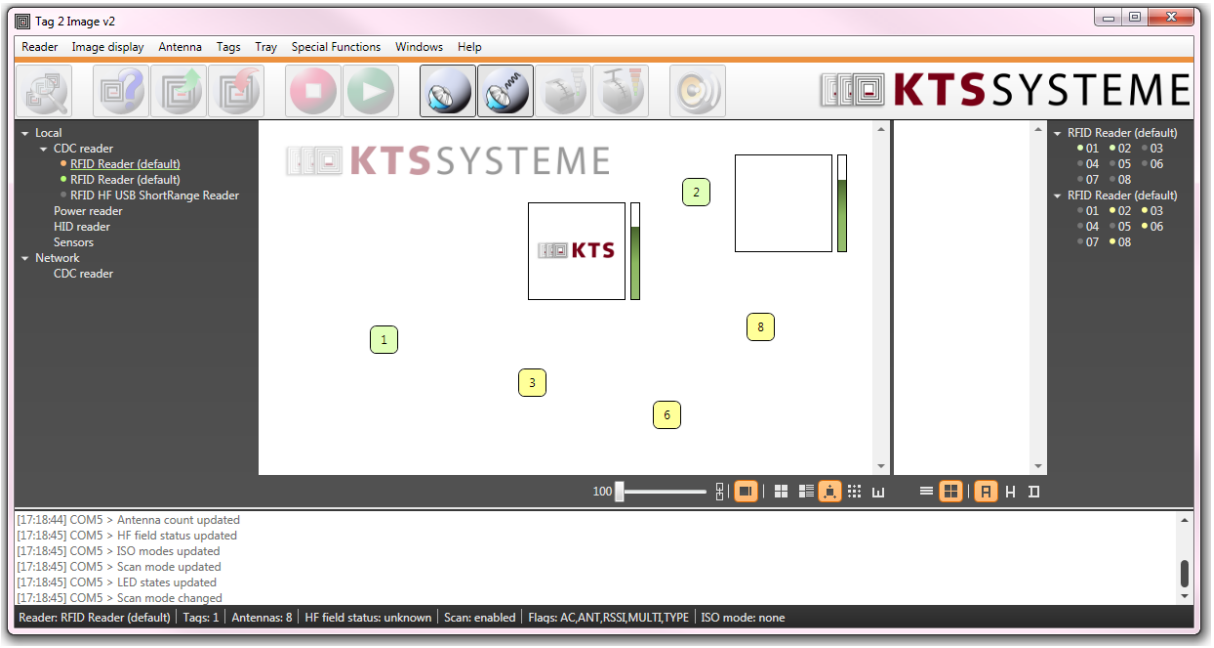
To display the memory content of a tag, you first have to switch the memory display to *TAG mode* using the menu underneath it. Once the memory display is configured correctly you can select a tag on the image display with a simple left click. The memory display will now show the memory content of the selected tag either as ASCII, hexadecimal or decimal values.



Should no memory be displayed, please make sure the reader on which the tag is detected has set the scan flag “DATA” since the reader would not report the tag memory content otherwise.

6.9 Display mode: Free positioning

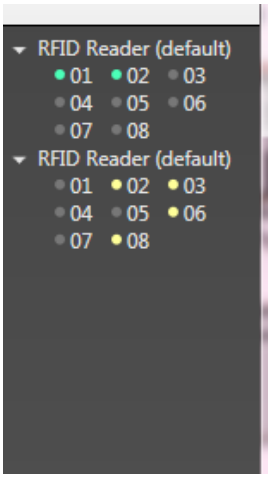
The *free positioning* display mode allows you to see the position of the tags relative to the position of the antennas on which the tags are detected. You can freely place the antennas of the selected reader as well as the antennas of the tagged readers on the image display. All tags detected by at least one of the placed antennas will have their position computed and will be displayed. The position of each tag is computed with respect to the position of the antennas and their signal strength for each of these antennas. If we don't have the RSSI value for the detecting antenna (i.e. the reader has not set the scan mode flag RSSI) we assume full signal strength.



The image above shows the free image display with one selected and one tagged reader. You can see the placed antennas on the display (they are also highlighted in the antenna list) as well as two tags which are detected by at least one of these antennas. The antennas can be distinguished on the image display by their color as well as their displayed number. The color of each antenna on the display is the same as the one of its indicator in the antenna list and can be chosen by the user.

The reader has to set at least the scan mode “ANT” since this gives us the antenna(s) detecting the tag. Otherwise we would not have the needed information to compute the tag position.

6.9.1 Add, remove and modify an antenna position



You can add an antenna to the display by dragging it from the antenna list and dropping it on the display at your chosen position. Each antenna with a position on the display will have its indicator near the antenna number colored in the antenna list. To modify its position, you can either drag it from the antenna list again or simply drag the antenna which is already on the display. To remove an antenna from the display, simply *double click* on it in the antenna list or on the image display.

Each reader has its own antenna color to differentiate the antennas on the display and you can change this color at any time (see chapter 6.9.4 for more information).

6.9.1 Change thumbnail size

You can change the height and width of the image thumbnails using the slider in the menu located underneath the image display. The size can be chosen in a range from 100 to 1000 pixel with a step size of 10 pixels.

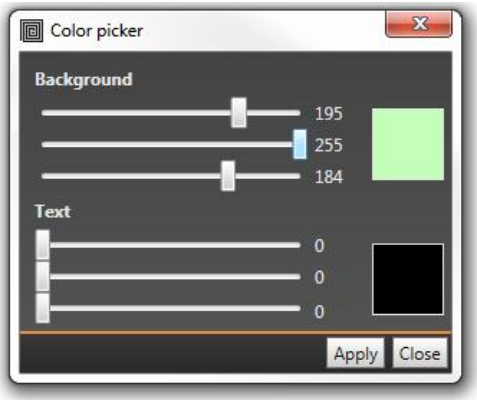
6.9.2 Global resize mode

The global resize mode allows you to specify one image size which will be used for the default display mode, the free positioning display mode as well as the grid display mode. If you activate the global resize mode, the thumbnail size slider will be replaced by one that is shared across these three display modes. It can be activated and deactivated using the button on the right hand side of the thumbnail size slider. Deactivating the global resize mode will replace the shared slider with the individual slider used by this display mode.

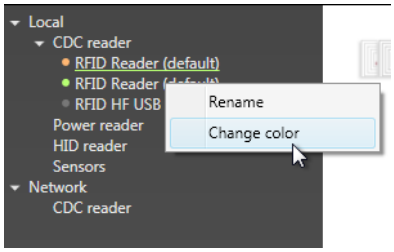
6.9.3 Show/hide RSSI indicator

You can show or hide the RSSI display respectively by checking or unchecking the option *Display RSSI Indicator* in the menu beneath the image display.

6.9.4 Change antenna color



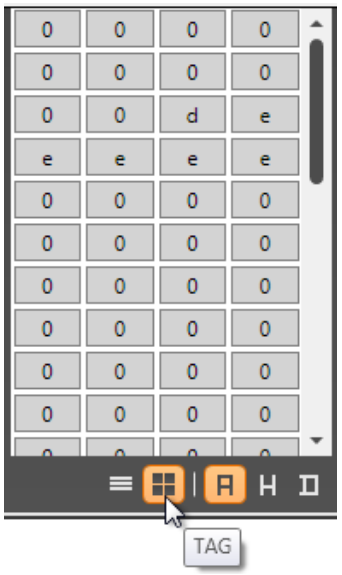
To differentiate the antennas on the image display and be able to know to which reader they belong, each reader has an associated text color and background color. You can change these colors in the color picker window. This window can be opened by right clicking on a reader in the device list and selecting the *Change color* option in the context menu.



The background color changes the color of the displayed antenna on the image display as well as the color of its corresponding indicator in the antenna list (only if it is placed since the indicator is gray if not). The text colors changes the font color of the antenna number on the image display.

6.9.5 Display memory content of a tag

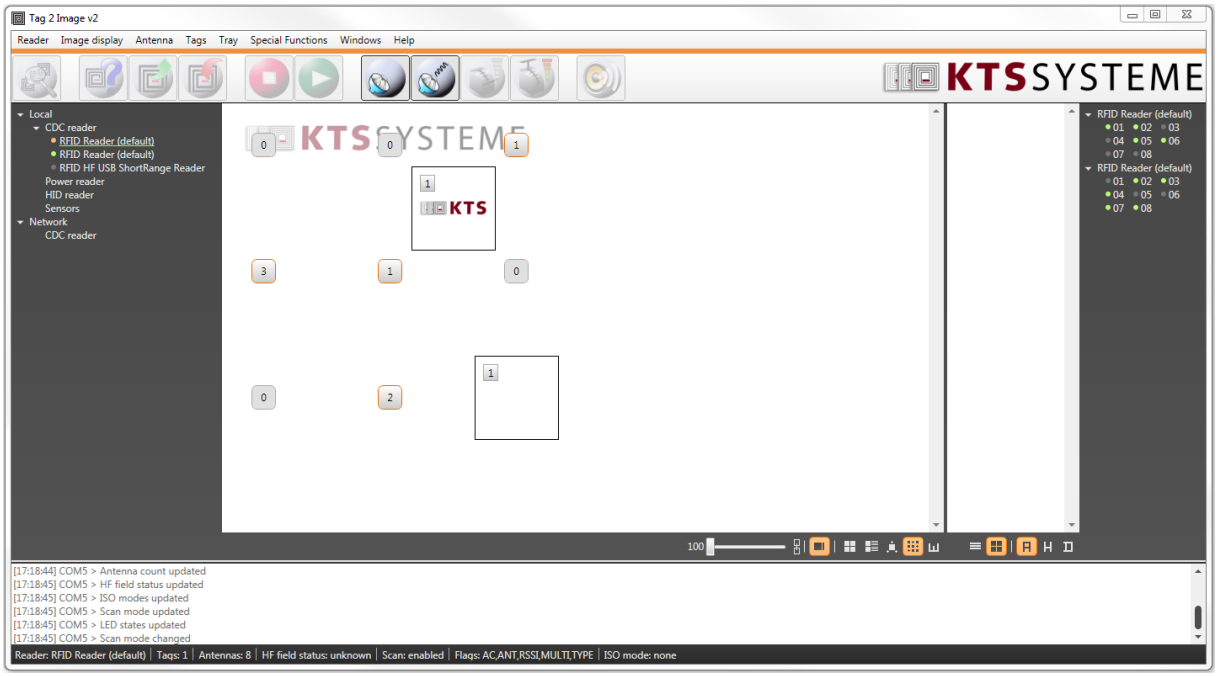
To display the memory content of a tag, you first have to switch the memory display to *TAG mode* using the menu underneath it. Once the memory display is configured correctly you can select a tag on the image display with a simple left click. The memory display will now show the memory content of the selected tag either as ASCII, hexadecimal or decimal values.



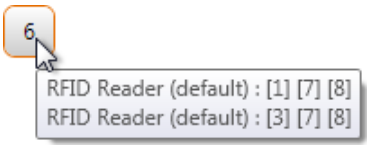
Should no memory be displayed, please make sure the reader on which the tag is detected has set the scan flag “DATA” since the reader would not report the tag memory content otherwise.

6.10 Display mode: Grid

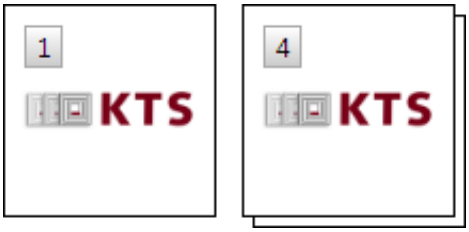
The grid display mode is similar to the free positioning display mode since it is designed specifically to show you the position of a tag in relation to the antennas detecting it. The key difference between this mode and the free positioning mode is that you cannot place the antennas at any arbitrary position on the display. The display shows a grid (3x3 by default – see chapter 6.10.4 to change it) and you can only place the antennas on these grid positions. Each tag detected by at least one positioned antenna will have its own position computed relative to the antennas detecting it and will be shown on the display. The tag position only depends on the position of the detecting antenna(s) and does not take the RSSI values into account (i.e. a tag detected by two placed antennas will always be displayed exactly in center between those two antennas – even if its signal strength is better for one of the detecting antennas).



The image above shows the grid display with the default 3x3 antenna grid. The number displayed on each position represents the number of antenna placed on this position. You can place as many antennas on the same position as you want. Hovering over an antenna position in the grid will open a tooltip containing the names of each reader having an antenna on this position as well as the antenna number for each of these antennas.

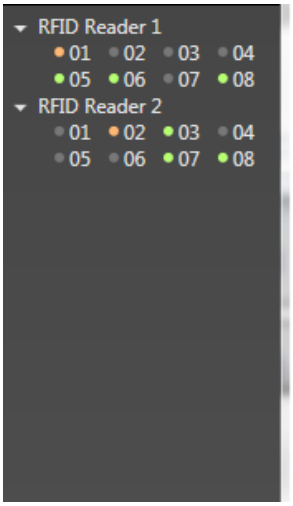


If only one tag is displayed at a given position you can see a thumbnail of the linked tag image. Should more than one tag share the same position on the display, you can see the thumbnail images of the first two tags stacked. The number in the upper left corner of the thumbnail shows the number of tags sharing the same position.



The reader has to set at least the scan mode “ANT” since this gives us the antenna(s) detecting the tag. Otherwise we would not have the needed information to compute the tag position.

6.10.1 Add, remove and modify an antenna position



You can add an antenna to the display by dragging it from the antenna list and dropping it on the display at one of the grid positions. Each antenna with a position on the display will have its indicator near the antenna number colored in the antenna list. To modify its position you can drag and drop it from the antenna list again. To remove an antenna from the display, *double click* it in the antenna list.

There are three possible colors for the indicator near the antenna number:

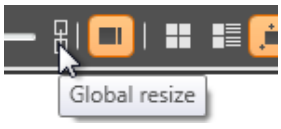
- **Gray**: the antenna is not placed on the grid
- **Green**: the antenna has a position inside the grid and is displayed
- **Orange**: the antenna has a position which is outside of the grid and cannot be displayed

The last one can happen if you, for example, place the antenna on grid position 3x2 but resize the grid to a 2x2 grid afterwards. In this case, the grid can no longer display the antenna but it will still remember its position. The antenna will be displayed at the selected position again as soon as the grid dimension is large enough.

6.10.2 Change thumbnail size

You can change the height and width of the image thumbnails using the slider in the menu located underneath the image display. The size can be chosen in a range from 100 to 1000 pixel with a step size of 10 pixels.

6.10.3 Global resize mode

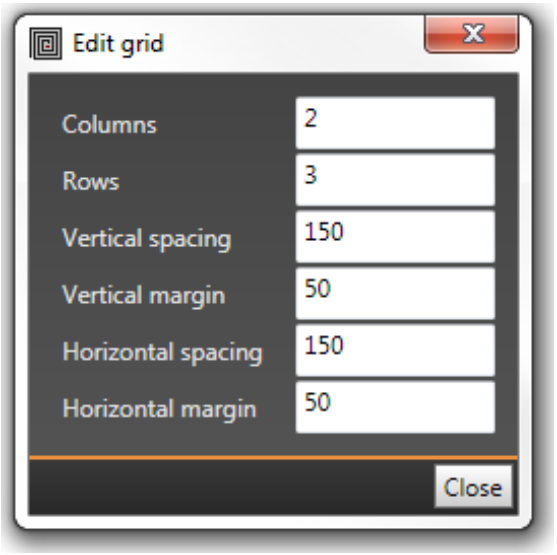


The global resize mode allows you to specify one image size which will be used for the default display mode, the free positioning display mode as well as the grid display mode. If you activate the global resize mode, the thumbnail size slider will be replaced by one that is shared across these

three display modes. It can be activated and deactivated using the button on the right hand side of the thumbnail size slider. Deactivating the global resize mode will replace the shared slider with the individual slider used by this display mode.

6.10.4 Change displayed antenna grid

You can modify the displayed grid at any time – even if there are currently antennas or tags displayed. Open the grid configuration window through the menu *Antenna → Grid configuration*. This configuration window allows you to change the following grid properties:

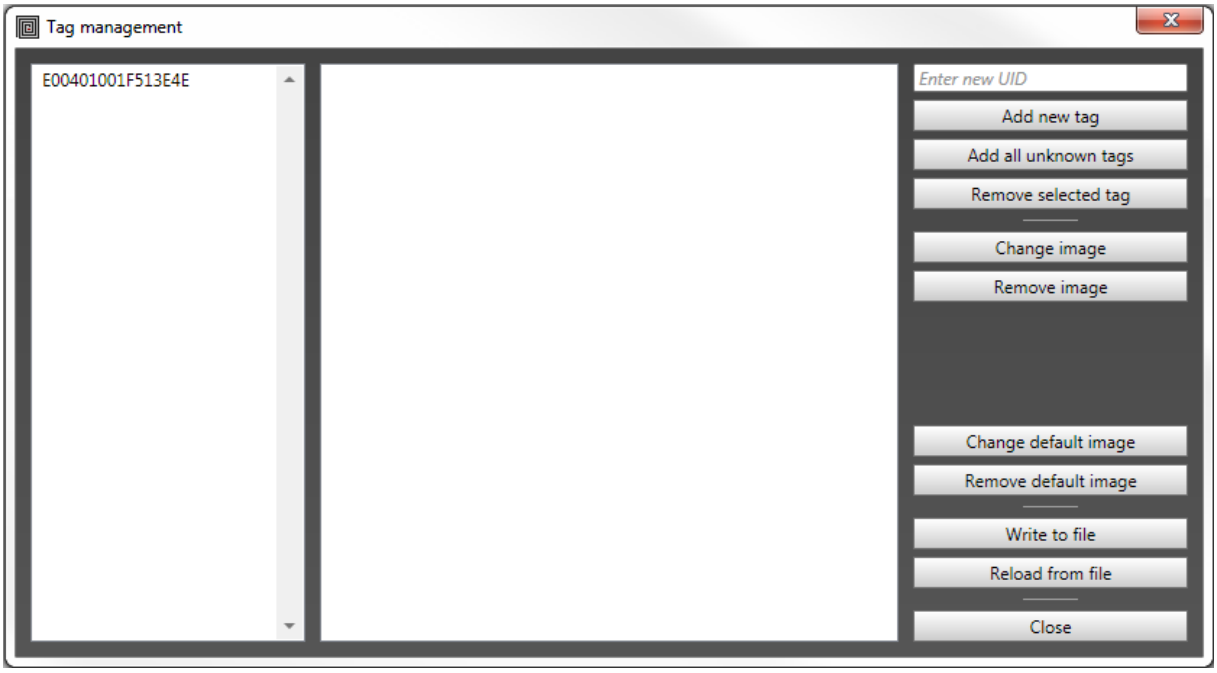


- **Columns**: the number of grid columns
- **Rows**: the number of grid rows
- **Vertical spacing**: the distance between the top side of the display and the first grid row
- **Vertical margin**: the distance between two grid rows
- **Horizontal spacing**: the distance between the left side of the display and the first grid column
- **Horizontal margin**: the distance between two grid columns

7 Tag management

The main function of Tag 2 Image is to display image thumbnails for the detected tags. The tag management window allows you manage a list of tag UIDs and to add, modify or remove the image you want to see associated with each of these unique identifiers. This way Tag 2 Image can display the image associated to the UID each time the tag has been detected.

You can open the tag management windows through the menu *Tags* → *Manage tags*.

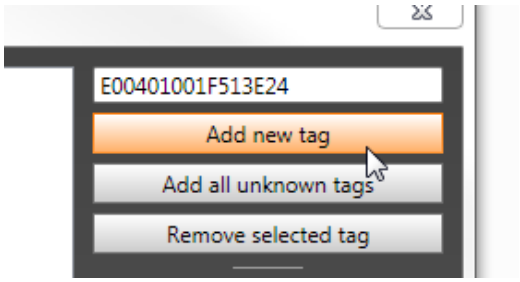


All changes made in this window are lost once you close Tag 2 Image. To avoid this, you have to save the changes to disc (see 7.4)

The window consists of the following three parts:

- The list containing all tag UIDs for which we can currently associate an image
- Thumbnail of the image currently associated with the selected UID
- Menu

7.1 Add/remove tag UIDs

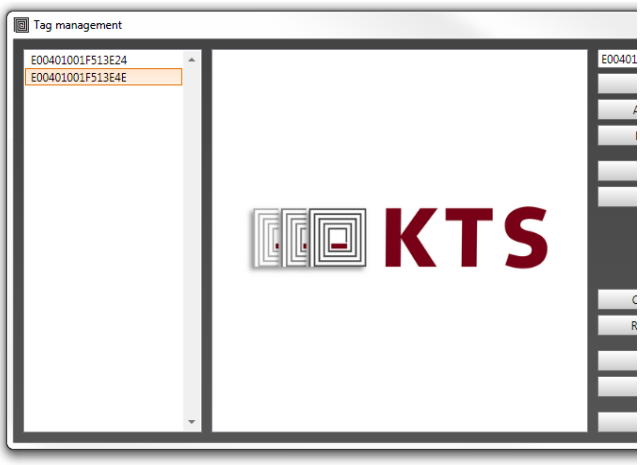


You have two options to add UIDs to the list. First of all, you can specify the tag UID in the corresponding field in the upper right corner and click on the *Add new tag* button. The specified UID can only contain *0-9,A,B,C,D,E,F* and its length cannot be shorter than 8 or longer than 20.

The second possibility is to use the function *Add all unknown tags.* This function will iterate thru all readers and add the UID of each tag currently detected by these readers.

To remove a UID from the list, select it and click on *Remove selected tag.*

7.2 Change the image linked to a UID



By selecting the UID in the list you can see the image currently associated with it in the preview area in the middle of the window. You can at any time change the image you linked to a specific UID by clicking on *Change image*. This will open a windows file selection dialog allowing you to select the new image. The *Remove image* button allows you to remove the image for the currently selected UID.

7.3 Default tag image

Per default, if a tag has no image linked to it, the thumbnail of the tag on the image display will be empty. If you don't want an empty thumbnail you can specify an image which will be used for all tags that don't have an image linked to them by clicking on *Change default image* in the menu. This will open a windows file selection dialog allowing you to select the new default image to use. The *Remove default image* button allows you to remove the image again.

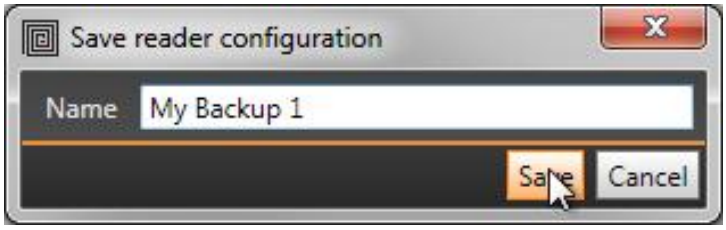
7.4 Save/reload the changes made to the list

All changes made to the list are lost once you close Tag 2 Image. To prevent this, the changes can be saved to a file on your hard disk drive by clicking on *Write to file*. You can also at any time reload the last saved state of the list from the file with *Reload from file*. Each time Tag 2 Image starts, it will automatically load the last saved state of the list.

8 Antenna position backups

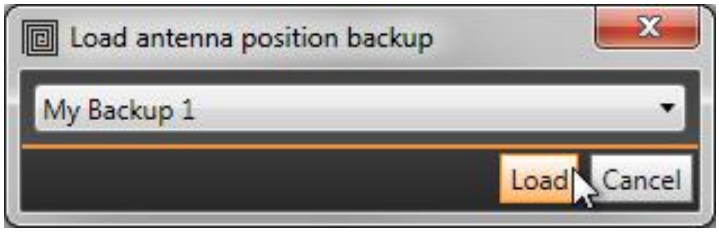
Tag 2 Image allows you to save a backup of the selected antennas in the default/details mode as well as the position of the antennas in free positioning and grid mode for a selected reader. This functionality allows you to configure your tag image display once for a reader and simply load it from a backup the next time you need it.

8.1 Create a backup



You can create a backup for the currently selected reader by using *Antenna → Save antenna position backup* in the menu. This will open a window asking you to specify a name for your backup. Once you decided how to name your backup, simply click on the save button. Should you chose a name which already belongs to a backup, you will be prompted to choose if you want to override the existing backup or not. The backup will contain the *current* state of the antenna list selection and antenna positions and will not be updated on future changes. If you want to update the backup you have to override it with the new state you want to save.

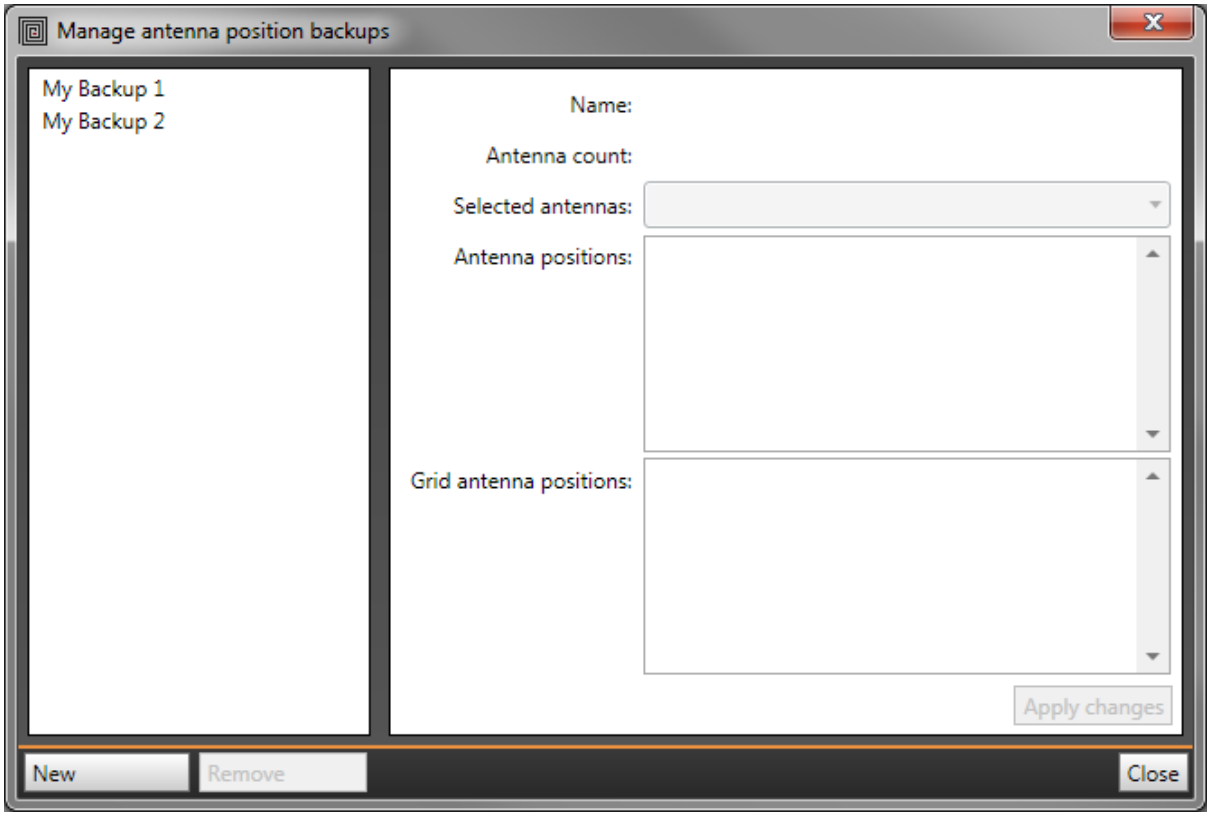
8.2 Load an existing backup



To load a backup, select a reader and go to *Antenna → Load antenna position backup*. This will open a new window allowing you to choose between the backups you previously created. The list only contains backups created for a reader with the exact same number of antennas. E.g. you won't be able to load a backup you created for a reader with a multiplexer and eight antennas if your selected reader does not also have exactly eight antennas. Loading a backup will replace the selection and positions of the antennas in all display modes according to the state saved in the backup.

8.3 Manage backups

You can manage the list containing all your backups at any time. You can open the Antenna position backup manager using *Antenna → Manage antenna position backups*.

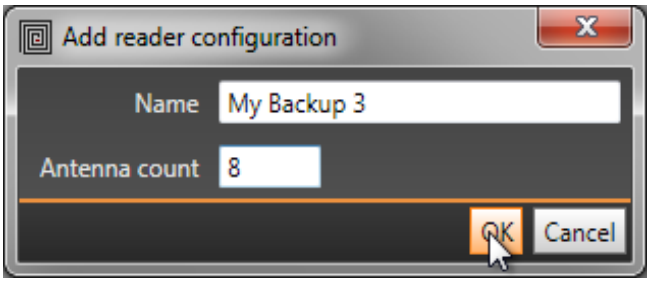


The window is divided into the following two parts:

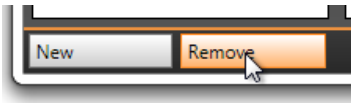
- A list containing all backups on the left
- A detailed view of the currently selected backup on the right

8.3.1 Add a new backup to the list

Aside from adding a backup with the current antenna selections and positions of a reader (see chapter 8.1) you can also add a “clean” backup to the list (i.e. a backup without any selection / position for the antennas). To add a new backup, click on *New* at the bottom of the list. You have to specify the name for your backup as well as the exact antenna number of the reader type for which this backup is created. Once the backup is created you won’t be able to change these values again.



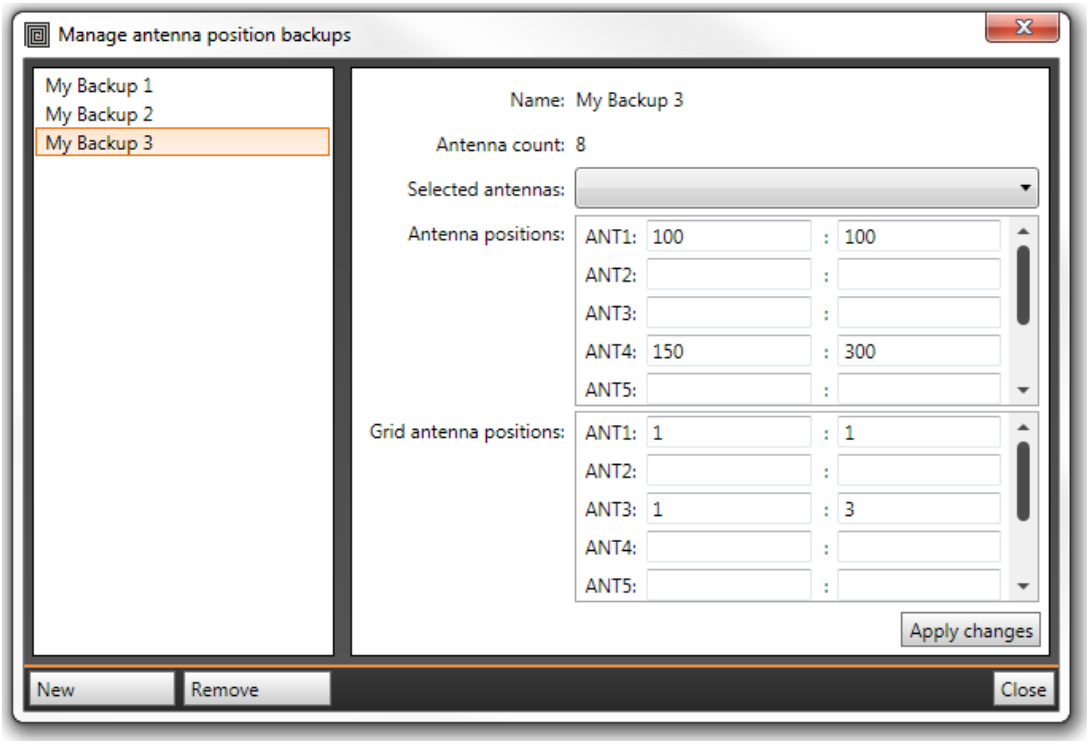
8.3.2 Remove a backup from the list



To remove a backup, select it in the list and click on the *Remove* button.

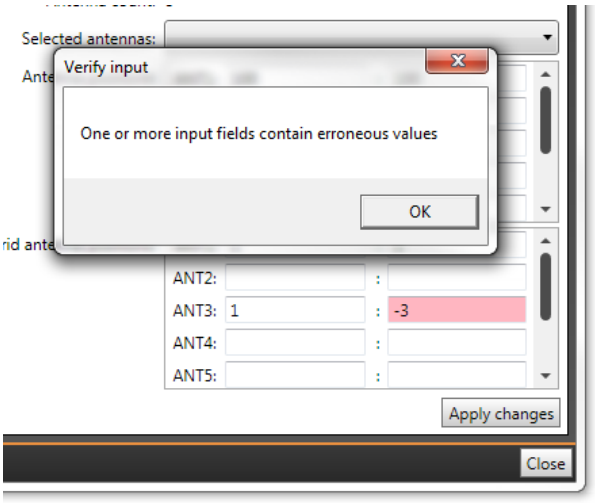
8.3.3 Modify an existing backup

To modify an existing backup, select it in the list. This will show you the current state of the backup on the right hand side of the management window and allow you to change the different values.



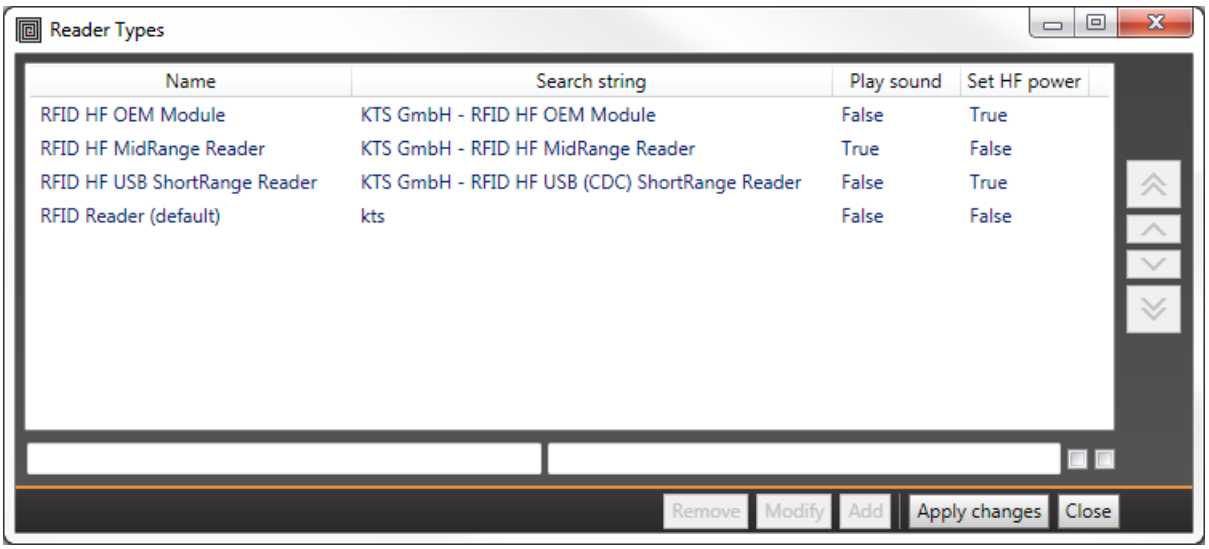
- **Name**: The name of the backup. This value cannot be changed.
- **Antenna count**: Number of antennas you can configure. This value cannot be changed.
- **Selected antennas**: Allows you to specify which antennas should be selected in the antenna list in the *default* and *details* display modes.
- **Antenna positions**: Set the horizontal and vertical position each antenna has on the display in the *free positioning* display mode (0:0 representing the upper left corner of the image display). If both the horizontal and vertical values are left empty, the antenna will not be displayed.
- **Grid antenna positions**: Set the horizontal and vertical position of the antenna in the grid display mode (1:1 being the upper left position in the grid). If both positions are left empty, the antenna will not be displayed in the grid.

The button *Apply changes* allows you to save all changes you made to the currently selected backup. Should a field contain an erroneous value (e.g. a negative value for the grid position of an antenna) you will receive an error message and the corresponding fields will be highlighted in red. If all values are valid and the backup could be saved, you will receive a popup with the message “All changes have been applied successfully”.



9 Manage reader types

The reader types management window allows you to specify the different KTS RFID reader types for which Tag 2 Image should scan on the serial port.



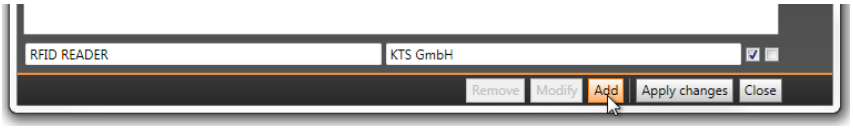
Tag 2 Image searches for a new KTS RFID reader by sending an ATI command to each serial port. The obtained response is then compared with the search strings of our reader types starting with the one at the top of the list. If the response contains the search string, we add the reader to our device list and set its name and ability to play a sound or change the HF field power according to the corresponding reader type.

Each reader type has the following attributes:

- Name: the name that will be displayed in the device list (can be chosen freely)
- Search string: the string we try to find in the readers ATI response
- Play sound: defines if the option to play a sound on the reader should be enabled for this reader type
- Set HF power: defines if the option to set the HF power should be enabled for this reader type

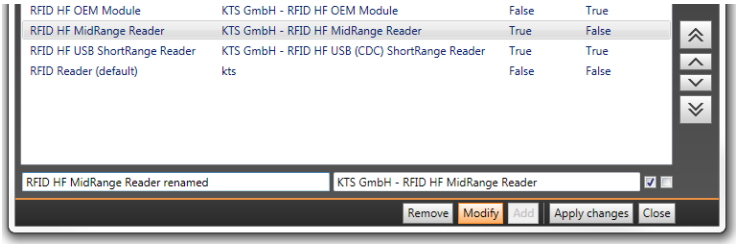
Closing the reader types management window without applying the changes will make you lose all changes you made since you opened the window.

9.1 Add a new reader type



To add a new reader type you have to specify its attributes in the input form underneath the reader types list. The first textbox has to contain the name for the reader and the second one has to contain its search string. The two checkboxes allow you to define if your reader type should be enabled to play a sound (left box) and/or set its HF power level (right box). Once you specified all values, you can add it by clicking on the *Add* button.

9.2 Modify an existing reader type

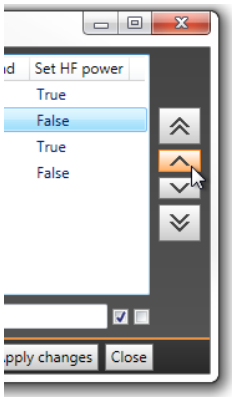


To modify an existing reader type you have to select it in the list. The fields underneath the list will now contain the current attributes of the selected reader type and allow you to change these values. Once you made your changes, you have to apply them using the button *Modify*.

9.3 Remove a reader type

To remove a reader type, select him in the list and click on the Remove button on the bottom of the window.

9.4 Change reader type priority



The arrows on the right hand side of the list allow you to set the search priority for the reader types by moving them up and down in the list. The higher the reader type is in the list, the sooner the ATI response will be compared to its search string.

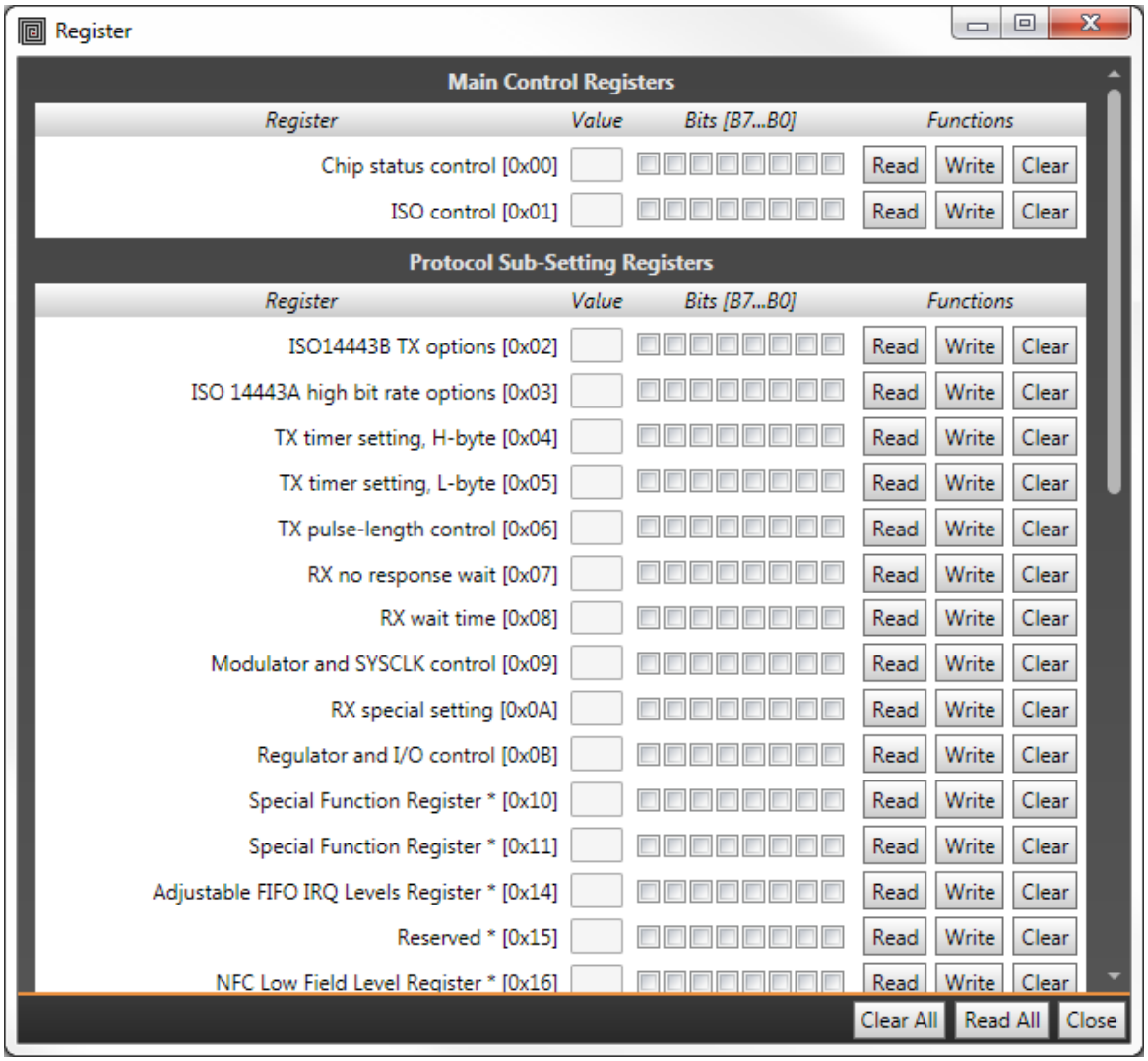
9.5 Apply changes

You have to apply the changes you made to the reader types list using the button Apply changes in the bottom right of the window. Closing the window without applying the changes will result in the changes being lost.

10 Special functions

10.1 Register

Tag 2 Image allows you to read from and write to the registers of a KTS RFID reader. To do so, select the reader you want to use in the reader list and open the register window using *Special Functions* → *Register*.



The column "*Register*" shows you the name and number of each register. The register content can be seen as a Hexadecimal value in the "*Value*" column and as single bits in the "*Bits [B7…Bo]*" column. Hovering over the single bits gives a detailed description of its functionality.

10.1.1 Read register value

You can either read the current value of a specific register by using the *Read* button next to it or you can read all register values at once by using *Read All* in the menu on the bottom. This updates the value in the columns “Value” and “Bits [B7…B0]” for the corresponding tag(s).

10.1.2 Change register value

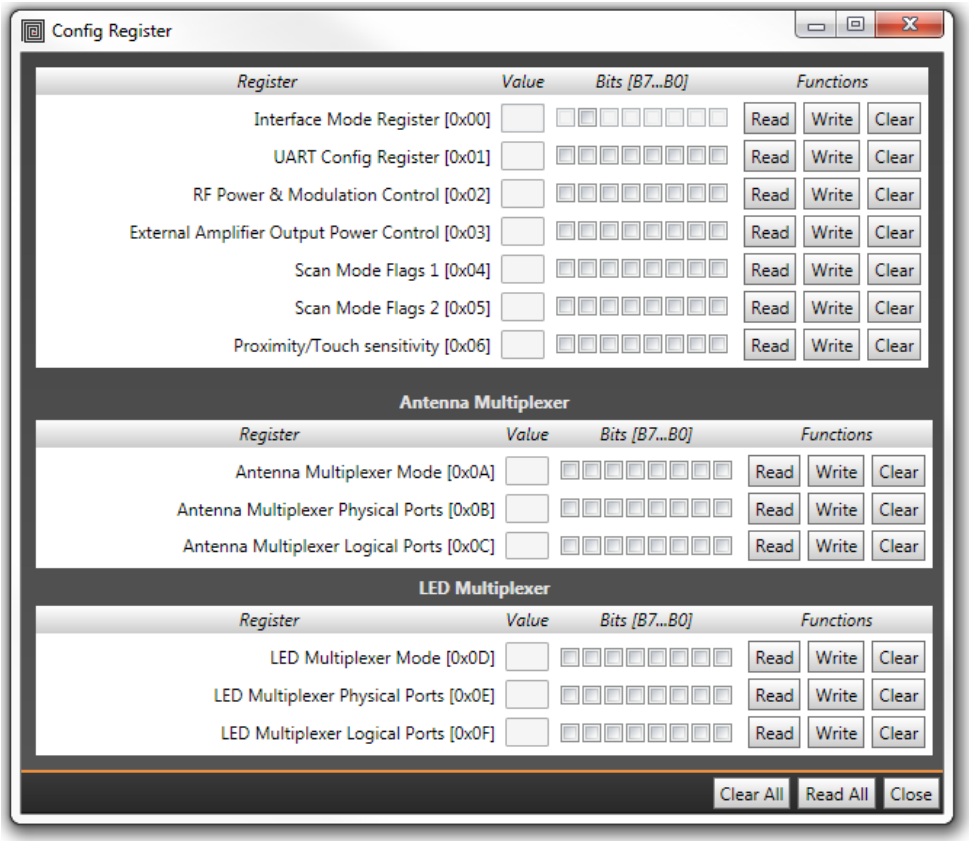
To modify the content of a register, you can either directly set the desired hexadecimal value in the value column or check the single bits you want to set. Once you made the changes for the register you can write them to the reader using the *Write* button.

10.1.3 Clear register display

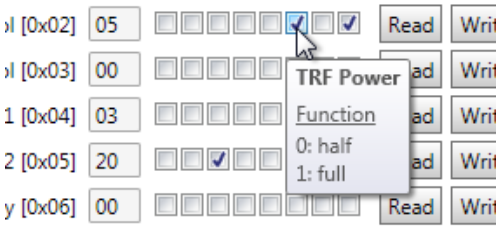
You can clear the displayed value of a register using the “Clear” button in the function column or clear the displayed value for all register using the “Clear All” button on the bottom of the window. Note that this only removes the value displayed in the register window and not the value of the reader register itself.

10.2 Config register

Tag 2 Image allows you to read from and write to the configuration registers of a KTS RFID reader. To do so, select the reader you want to use in the reader list and open the register window using *Special Functions → Config Register*.



The column "*Register*" shows you the name and number of each register. The register content can be seen as a Hexadecimal value in the "*Value*" column and as single bits in the "*Bits [B7…Bo]*" column. Hovering over the single bits gives a detailed description of its functionality.



10.2.1 Read register value

You can either read the current value of a specific register by using the *Read* button next to it or you can read all register values at once by using *Read All* in the menu on the bottom. This updates the value in the columns "Value" and "Bits [B7…B0]" for the corresponding tag(s).

10.2.2 Change register value

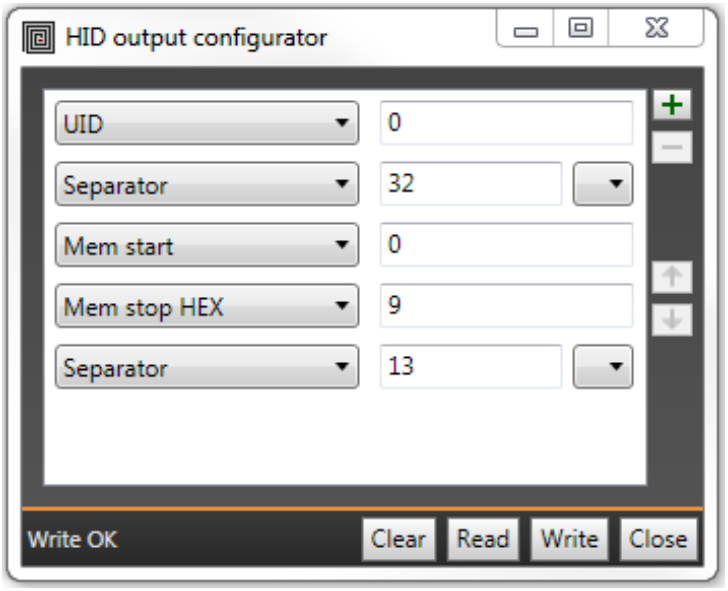
To modify the content of a register, you can either directly set the desired hexadecimal value in the value column or check the single bits you want to set. Once you made the changes for the register you can write them to the reader using the *Write* button.

10.2.3 Clear register display

You can clear the displayed value of a register using the "Clear" button in the function column or clear the displayed value for all register using the "Clear All" button on the bottom of the window. Note that this only removes the value displayed in the register window and not the value of the reader register itself.

10.3 HID output configurator

Tag 2 Image allows you to customize the keystrokes sent to the USB Host when a tag is detected on a KTS RFID reader in HID mode. Select the reader you want to configure and open the HID output configurator via the menu *Special Functions → HID output config*. The selected ready can be either in HID or in CDC mode.



You can compose the desired output using a combination of the following key/value pairs:

Key	Value	Description
UID	-	The UID is passed as keyboard strokes.
Mem start	Start byte address	No output is generated. The start of a memory output is prepared.
Mem stop HEX	End byte address	The memory from the memory start address to the end address is passed as keystrokes representing the hexadecimal values.
Mem stop ASCII	End byte address	The memory from memory start address to the end address is passed as keystrokes for the memory stored ASCII character.
Separator	ASCII code of the separator	Sends a single keystroke for the specified ASCII character. The drop down list next to the value input allows you to easily select between frequently used separators.

You can use a maximum of 16 key/value pairs to describe your output.

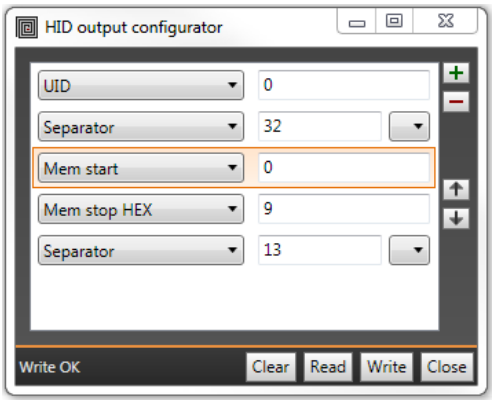
Let us look at the configuration in the image above as an example. The output of a HID reader with this configuration would be “<UID><space><memory bytes 0 to 9 in HEX><\r>”.

e.g.:

- E00401001F5134BE 746573743F3F3F3F3F3F
- E00401001F30ABE8 2A66672A000000000000
- E00401001F30C41C 30303030303030303030

10.3.1 Add/remove a key/value pair to the output configuration

The “+” and “-“ buttons on the right hand side allow you to add a new key/value pair to or remove the selected key/value pair from the output configuration.



Note that you cannot have more than 16 key/value pairs at any given time.

10.3.2 Reorganize the key/value pairs

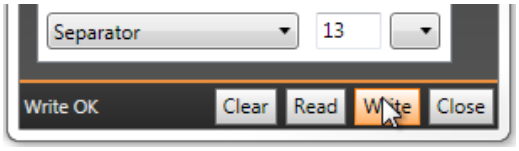
The arrows on the right hand side allow you to move the selected key/value pair up or down in the list.

10.3.3 Read the current output configuration

Click on the button “Read” to discover the current output configuration of the reader. This will update the displayed configuration with the values currently used by the reader. The status bar will show the message “Read OK” if successful or “Read ERROR” if not.

10.3.4 Write the output configuration to the reader

You can write the displayed output configuration to the reader using the button “Write” at the bottom of the window. The status bar will show the message “Write OK” if successful or “Write ERROR” if not.



10.3.5 Clear display

The button “Clear” allows you to remove all key/value pairs from the output configuration window.

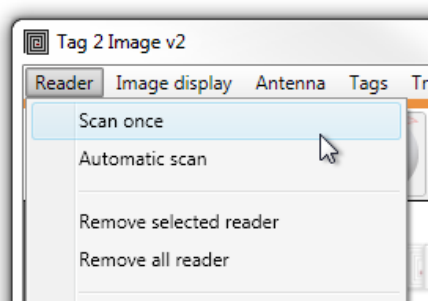
11 Other device types

11.1 KTS RFID reader (HID mode)

All USB enabled KTS RFID Reader can be used as a HID device and you can use Tag 2 Image to customize the keystrokes sent to the USB Host when a tag is detected.

11.1.1 Add a reader to the device list

Tag 2 Image is able to automatically search for connected readers on all COM ports. You have two options to start a new search:



1. Scan Once: through the menu *Reader → Scan once* you can start a single search over all ports. Any pending search has to complete before issuing a new one. Once the scan it is finished, the log will display the message “Scan complete” followed by the number of readers found.
2. Automatic scan: you can check the menu item *Reader → Automatic scan* which will start a new search every few seconds until you stop it again.

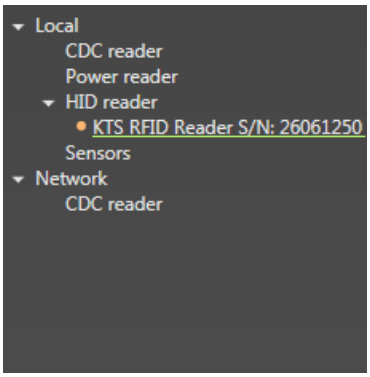
If a reader is found, the reader is added to the device list within the category *Local/HID reader*.

Each time a new scan is started, all KTS RFID Reader in HID mode are removed from the device list. This means the reader will be constantly added and removed from the list while using automatic scan.

11.1.2 Remove a reader from the device list

To remove a KTS RFID Reader in HID mode from the device list, unplug it from your computer and start a new reader scan (see chapter 11.1.1) since starting a new scan will clear the list containing all KTS RFID Reader in HID mode.

11.1.3 Select a reader



You can only select one device at any given time. To do so, simply select it in the reader list by left clicking on its name. The selected reader will be underlined in the list and the status indicator near the name switches to orange. To deselect the reader again, hold the *CTRL* key and *left click* on the selected reader

11.1.4 Configure HID output

See chapter 10.3 for a detailed description on how to configure the reader output in HID mode.

11.1.5 Switch reader to CDC mode

You can switch a selected KTS RFID Reader from HID to CDC mode through the menu *Reader* → *Switch to CDC*. If successful, the reader is removed from the device list. A message showing the success or failure of the operation is added to the log.

12 Document history

Revision	Date	List of changes	Author
1.0	27.08.2012	Initial release	ChS
1.1	28.08.2012	Spelling / syntax Text formatting Removed description of project-related T2I functions	ChS
1.2	28.08.2012	Spelling / syntax Added document history Added contact information	ChS

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